

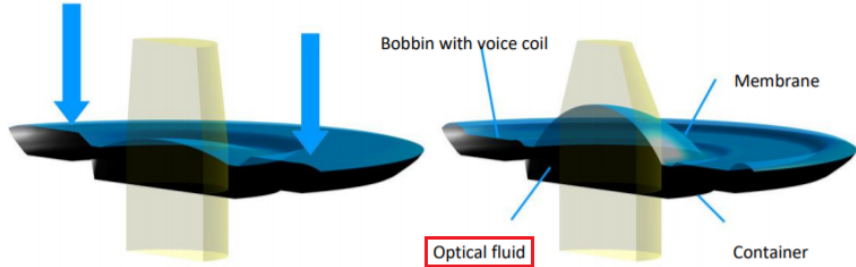
EXHIBIT 18

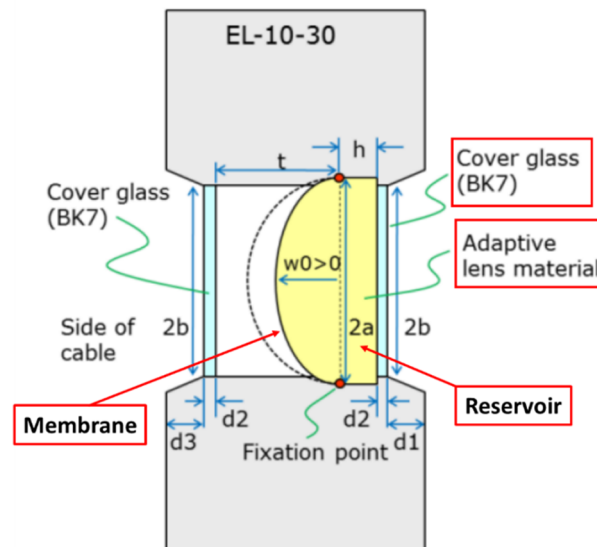
Exhibit No. 18

Infringement Claim Chart of U.S. Patent No. 9,442,225 by Optotune and Edmund Optics¹

Accused products including Optotune's liquid focus tunable lenses based on electrical actuation (including EL-3-10, EL-10-30-TC, EL-10-30-C, EL-10-42-OF, EL-16-40-TC, and ELM lens) and Edmund Optics' liquid lens products that integrate Optotune's electrically actuated liquid focus tunable lenses (including MercuryTL™ Liquid Lens Telecentric Lenses, Optotune Focus Tunable Lens, Tunable Compact Objective Liquid Lens Assemblies, LT Series Fixed Focal Length Lenses, and Dynamic Focus VZM™ Lens) (the "Accused Products") infringe each element of the Asserted Claims of U.S. Patent No. 9,442,225 (the "'225 Patent"). Further, Optotune and Edmund Optics instruct their customers regarding the use of the Accused Products to enable the use of the features identified throughout this chart. Optotune and Edmund Optics intend and instruct that their customers use these features in a manner that practices each element of the Asserted Claims. Plaintiff contends each of the following limitations is met literally, and, to the extent a limitation is not met literally, it is met under the doctrine of equivalents.

¹ This claim chart is based on the information currently available to Plaintiff and is intended to be exemplary in nature. Plaintiff reserves all rights to update and elaborate their infringement positions, including as Plaintiff obtains additional information during the course of discovery.

Claim	Accused Products
<p>[1Pre] A fluidic lens, comprising:</p>	<p>The Accused Products meet this limitation.</p> <p>The Optotune EL-10-30-C includes a fluidic lens (i.e. electrically tunable lens EL-10-30-C with optical fluid). More specifically, the Optotune EL-10-30-C lens is a shape-changing lens based on a combination of optical fluids and a polymer membrane.</p> <p>Working principle</p> <p><u>The EL-10-30 is a shape-changing lens, as illustrated in Figure 5. It consists of a container, which is filled with an optical fluid and sealed off with an elastic polymer membrane. The deflection of the lens is proportional to the pressure in the fluid. The EL-10-30 has an electromagnetic actuator that is used to exert pressure on the container. Hence, the focal distance of the lens is controlled by the current flowing through the coil of the actuator.</u></p>  <p><i>Figure 5: Working principle of the EL-10-30 series.</i></p> <p>Optotune EL-10-30-Series Spec Sheet at 6.</p>
<p>[1A] a reservoir at least partially bounded by a first optical surface and a second optical surface;</p>	<p>The Accused Products meet this limitation.</p> <p>The Optotune EL-10-30-C includes a reservoir at least partially bounded by a first optical surface (i.e., membrane) and a second optical surface (i.e., cover glass).</p>



Optotune EL-10-30-Series Spec Sheet at 5.

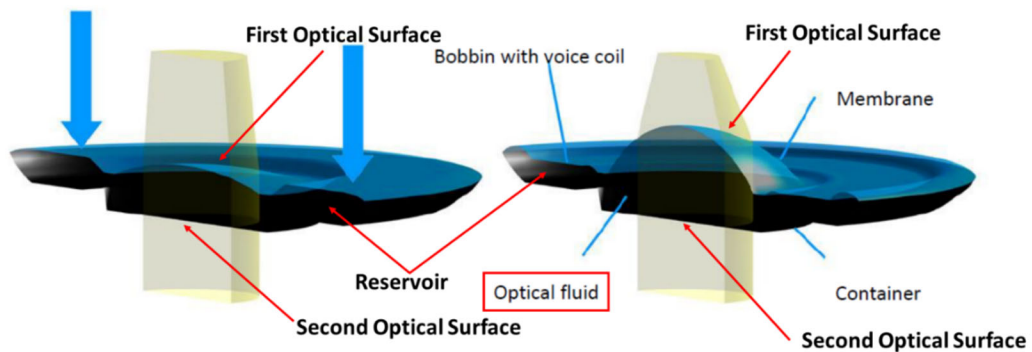


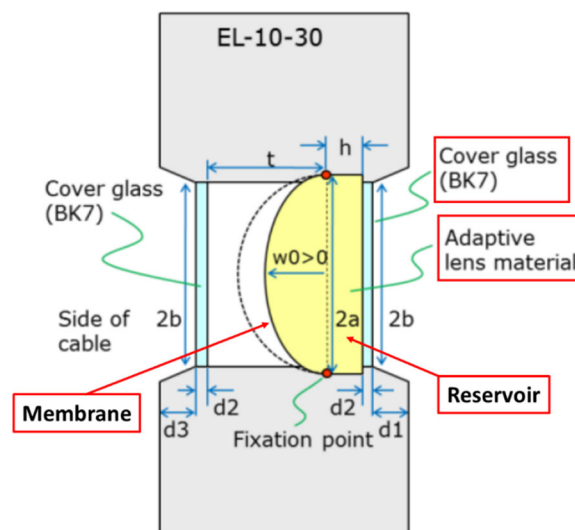
Figure 5: Working principle of the EL-10-30 series.

Optotune EL-10-30-Series Spec Sheet at 6.

[1B] a fluid; wherein the fluid fills a volume of the reservoir;

The Accused Products meet this limitation.

The Optotune EL-10-30-C includes a fluid (also referred to as adaptive lens material) that fills a volume of the reservoir.



Optotune EL-10-30-Series Spec Sheet at 5.

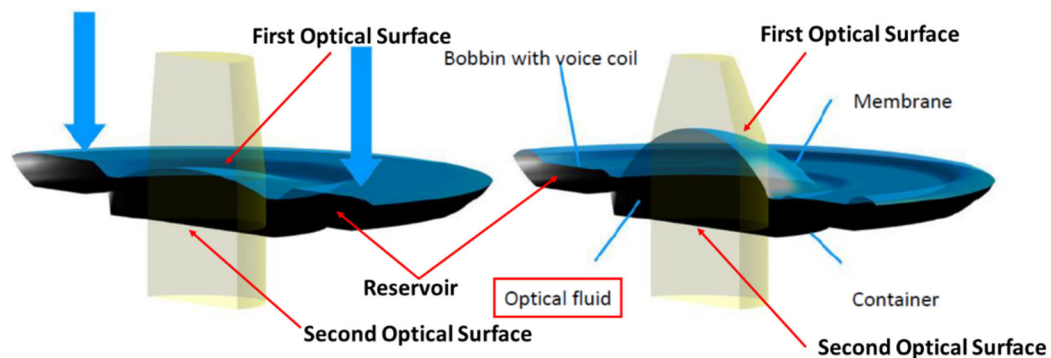


Figure 5: Working principle of the EL-10-30 series.

Optotune EL-10-30-Series Spec Sheet at 6.

Working principle

The EL-10-30 is a shape-changing lens, as illustrated in Figure 5. It consists of a container, which is filled with an optical fluid and sealed off with an elastic polymer membrane. The deflection of the lens is proportional to the pressure in the fluid. The EL-10-30 has an electromagnetic actuator that is used to exert pressure on the container. Hence, the focal distance of the lens is controlled by the current flowing through the coil of the actuator.

Optotune EL-10-30-Series Spec Sheet at 6.

[1C] a rim configured to contact a portion of the first or second optical surface from outside the reservoir,

The Accused Products meet this limitation.

The Optotune EL-10-30-C includes a lens shaper (i.e., rim) configured to contact the membrane (i.e., first optical surface) from outside the reservoir (i.e., the lens shaper remains in place relative to the container or reservoir).

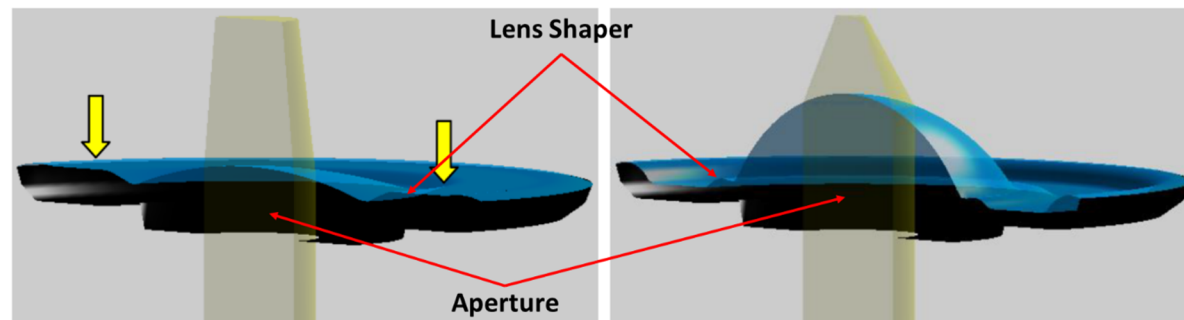
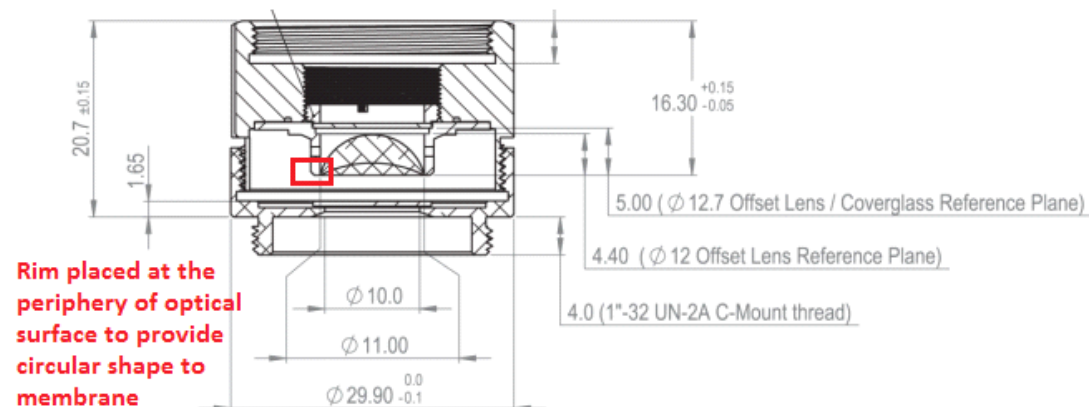


Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.

Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.



Optotune EL-10-30-Series Spec Sheet at 3.

The Optotune EL-10-30-C also includes an actuation ring that is in contact with the membrane (i.e., first optical surface) and configured to push down the membrane during actuation.

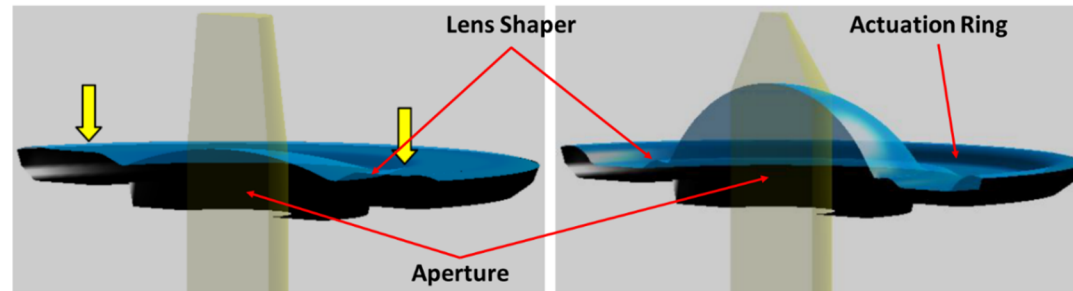


Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.

Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.

[1D] wherein one or more of the first optical surface or second optical surface is configured to deform as a result of a change in a pressure applied to the fluid or a change in contact between the rim and the first or second optical surface,

The Accused Products meet this limitation.

The Optotune EL-10-30-C includes an electromagnetic actuator to apply a pressure to the fluid by pressing the outer portion of the membrane (i.e., first optical surface). The pressure change deforms the center portion of the membrane (i.e., first optical surface). The actuation force applied by the electromagnetic actuator also changes the contact between the lens shaper (i.e., rim) and the membrane (i.e., first optical surface). More specifically, the lens shaper is fixed to the membrane to define the clear aperture and pressing the outer portion of the membrane changes the contact force between the lens shaper and the membrane. Such change of contact force also leads to the deformation of the center portion of the membrane (i.e., the portion of the membrane within the lens shaper).

Working principle

The EL-10-30 is a shape-changing lens, as illustrated in Figure 5. It consists of a container, which is filled with an optical fluid and sealed off with an elastic polymer membrane. The deflection of the lens is proportional to the pressure in the fluid. The EL-10-30 has an electromagnetic actuator that is used to exert pressure on the container. Hence, the focal distance of the lens is controlled by the current flowing through the coil of the actuator.

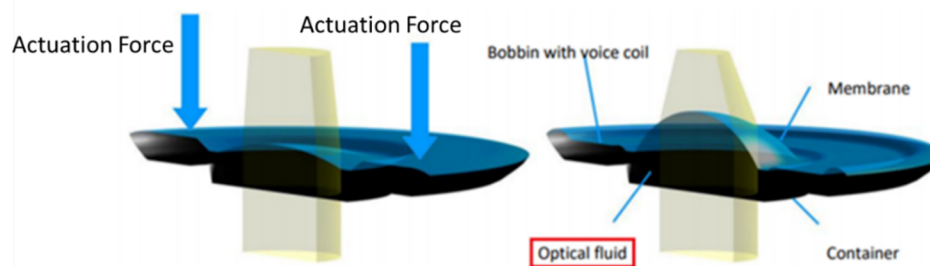


Figure 5: Working principle of the EL-10-30 series.

Optotune EL-10-30-Series Spec Sheet at 6.

Resolution and reproducibility

The step size of the focal power is limited by the resolution of the DAC of the current driver. For high precision applications a driver with 12 bits is recommended. As the relation between current and focal power is linear, the smallest step of e.g. the EL-10-30-C-VIS-LD about 0.0018 Dpt.

Unlike piezo systems, the EL-10-30 exhibits no hysteresis. The current through the coil induces a force, which is directly transferred onto the elastic membrane. There is no friction in the system. This means that at a constant temperature jumping between alternate current levels will always yield the same focal length. The effect of changes in temperature are described above. Optotune's Lens Driver 4 offers a focal power mode, which makes use of calibration data stored in the lens (EEPROM of the STTS2004). The absolute reproducibility achieved over an operating temperature range of 10 to 50°C amounts to typically 0.1 diopters. More details on the focal power mode are provided in the Lens Driver manual.

Optotune EL-10-30-Series Spec Sheet at 10.

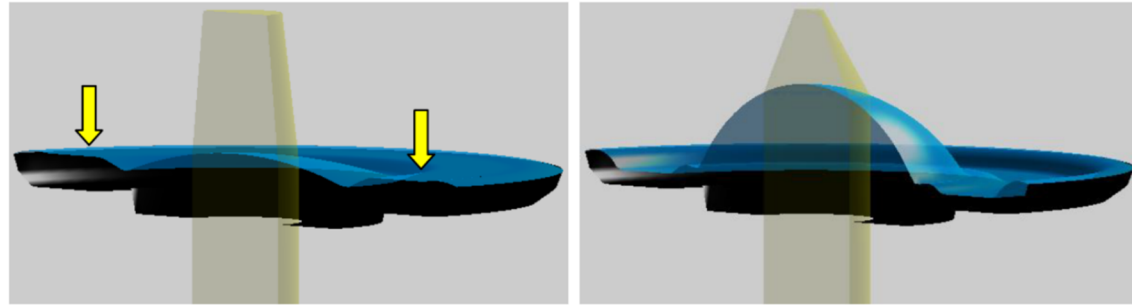


Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.

Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.

In addition, the membrane in Optotune EL-10-30-C is configured to deform as a result of a change in a pressure applied to the fluid (e.g., pressure applied by the actuation ring). Alternatively, the membrane is also configured to deform as a result of a change in contact between the actuation ring and the membrane, i.e., the actuation pushes down on the membrane and therefore changes the pressure between them. The change in pressure, in turn, causes the center portion of the membrane to deform.

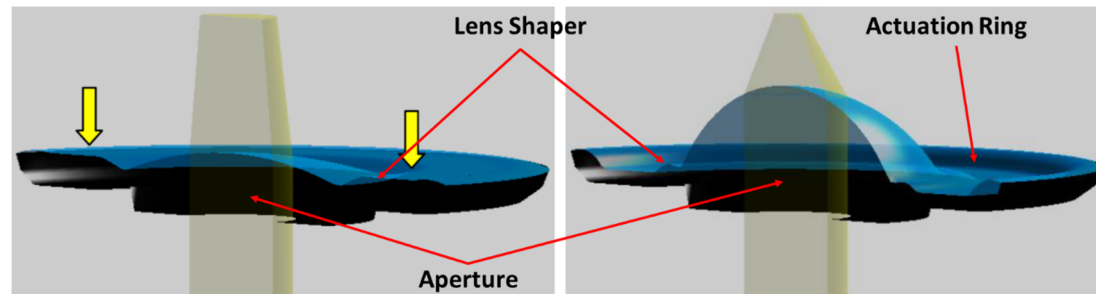


Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.

Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.

[1E] wherein the reservoir is configured to be brought into said contact with the rim and/or the rim is configured to be brought into said contact with the reservoir.

The Accused Products meet this limitation.

The reservoir in the Optotune EL-10-30-C is brought into said contact with the lens shaper (i.e., rim). More specifically, an actuation ring is configured to press the membrane and create said contact force between the lens shaper and the membrane, and the said contact force is corresponding to the actuated state of the membrane.

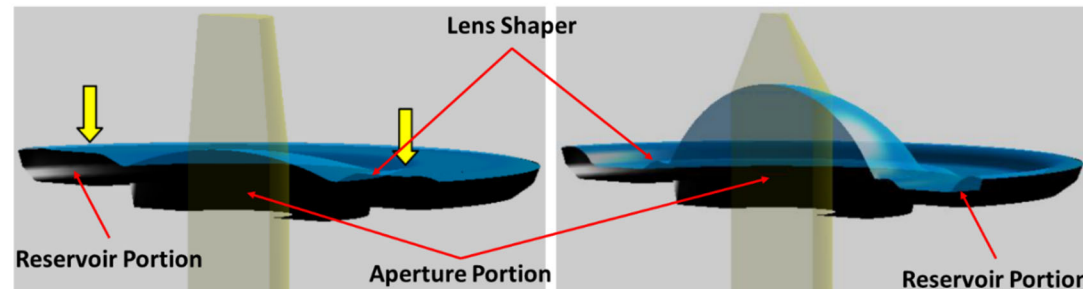


Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.

Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.

The actuation ring in the Optotune EL-10-30-C is configured to be brought into contact with the membrane that is part of the reservoir. More specifically, the actuation ring is driven by a voice coil to apply different contact pressures to the reservoir.

Working principle

The EL-10-30 is a shape-changing lens, as illustrated in Figure 5. It consists of a container, which is filled with an optical fluid and sealed off with an elastic polymer membrane. The deflection of the lens is proportional to the pressure in the fluid. The EL-10-30 has an electromagnetic actuator that is used to exert pressure on the container. Hence, the focal distance of the lens is controlled by the current flowing through the coil of the actuator.

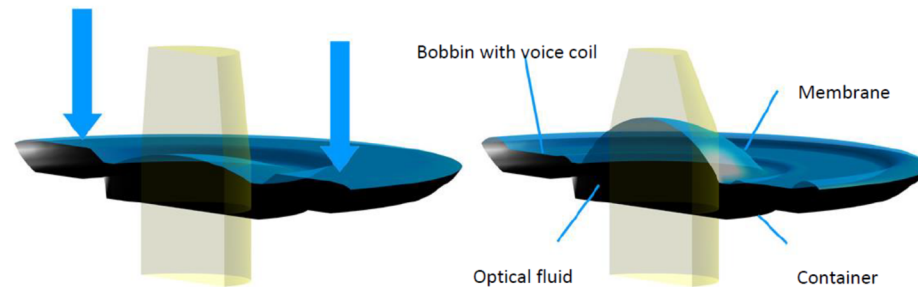


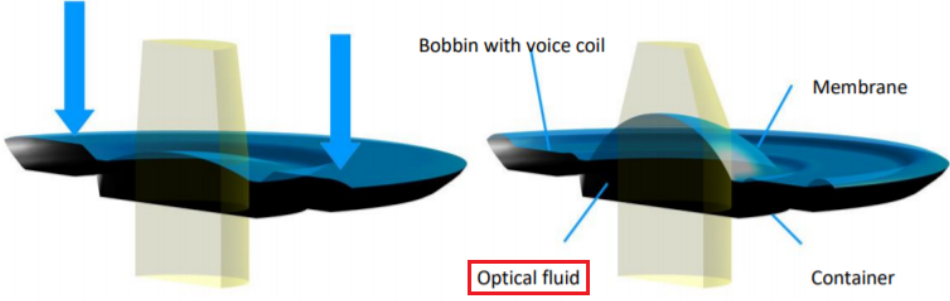
Figure 5: Working principle of the EL-10-30 series.

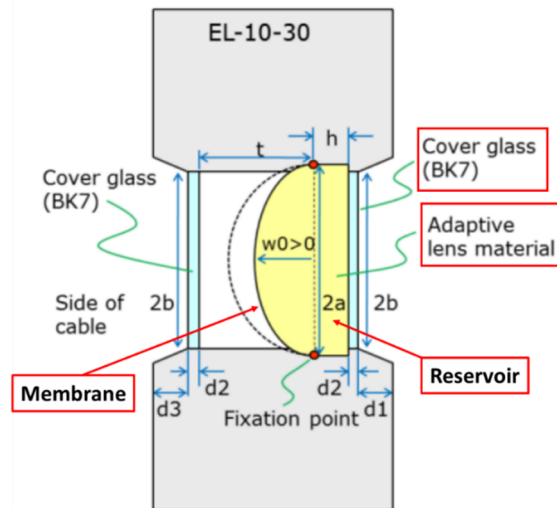
Optotune EL-10-30-Series Spec Sheet at 6.

[11Pre] A fluidic lens, comprising:

The Accused Products meet this limitation.

The Optotune EL-10-30-C includes a fluidic lens (i.e. electrically tunable lens EL-10-30-C with optical fluid). More specifically, the Optotune EL-10-30-C lens is a shape-changing lens based on a combination of optical fluids and a polymer membrane.

	<p>Working principle</p> <p><u>The EL-10-30 is a shape-changing lens, as illustrated in Figure 5. It consists of a container, which is filled with an optical fluid and sealed off with an elastic polymer membrane. The deflection of the lens is proportional to the pressure in the fluid. The EL-10-30 has an electromagnetic actuator that is used to exert pressure on the container. Hence, the focal distance of the lens is controlled by the current flowing through the coil of the actuator.</u></p>  <p><i>Figure 5: Working principle of the EL-10-30 series.</i></p> <p>Optotune EL-10-30-Series Spec Sheet at 6.</p>
[11A] a reservoir at least partially bounded by a first optical surface and a second optical surface;	<p>The Accused Products meet this limitation.</p> <p>The Optotune EL-10-30-C includes a reservoir at least partially bounded by a first optical surface (i.e., membrane) and a second optical surface (i.e., cover glass).</p>



Optotune EL-10-30-Series Spec Sheet at 5.

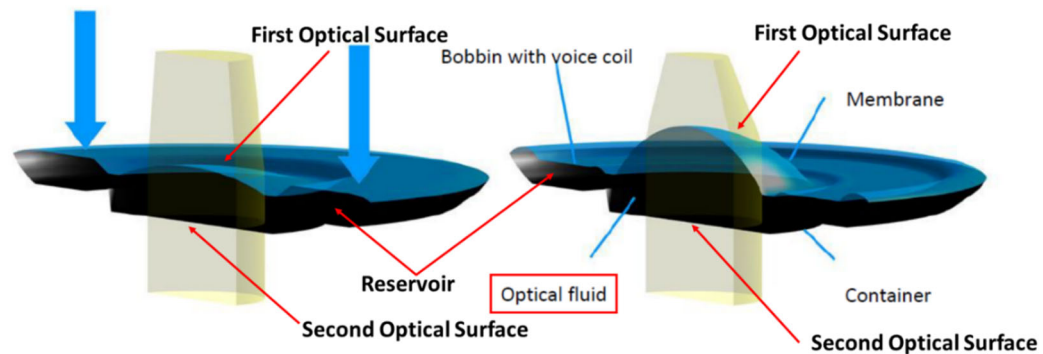


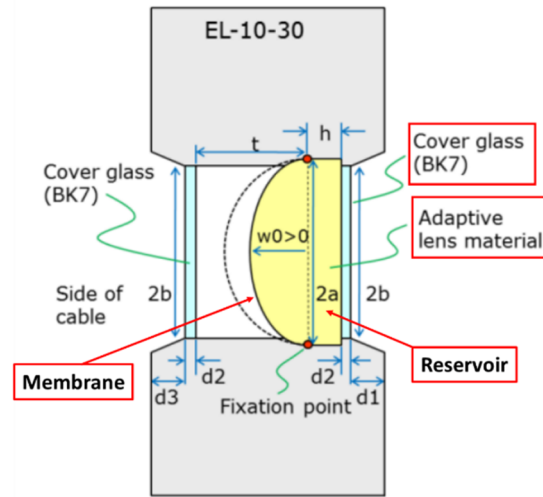
Figure 5: Working principle of the EL-10-30 series.

Optotune EL-10-30-Series Spec Sheet at 6.

[11B] a fluid; wherein the fluid fills a volume of the reservoir,

The Accused Products meet this limitation.

The Optotune EL-10-30-C includes a fluid (also referred to as adaptive lens material) that fills a volume of the reservoir.



Optotune EL-10-30-Series Spec Sheet at 5.

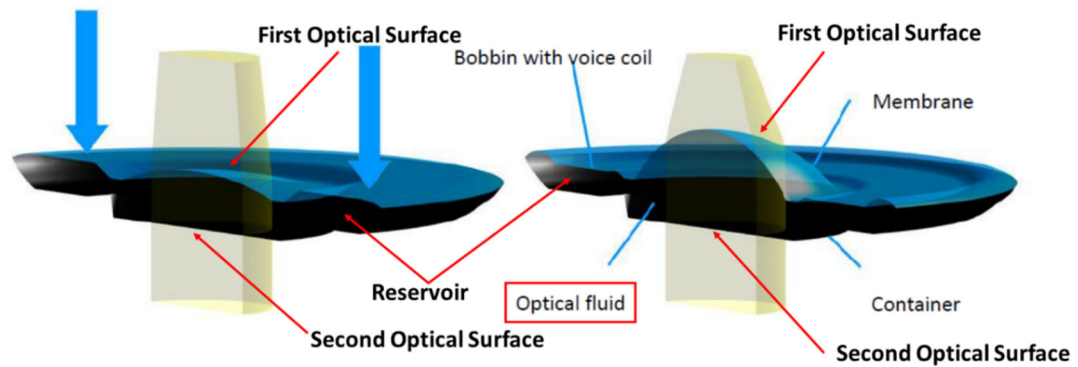


Figure 5: Working principle of the EL-10-30 series.

Optotune EL-10-30-Series Spec Sheet at 6.

	<p>Working principle</p> <p><u>The EL-10-30 is a shape-changing lens, as illustrated in Figure 5. It consists of a container, which is filled with an optical fluid and sealed off with an elastic polymer membrane. The deflection of the lens is proportional to the pressure in the fluid. The EL-10-30 has an electromagnetic actuator that is used to exert pressure on the container. Hence, the focal distance of the lens is controlled by the current flowing through the coil of the actuator.</u></p> <p>Optotune EL-10-30-Series Spec Sheet at 6.</p>
<p>[11C] wherein a rim divides the fluid-filled volume of the reservoir into an aperture portion and a reservoir portion,</p>	<p>The Accused Products meet this limitation.</p> <p>The Optotune EL-10-30-C includes a lens shaper (i.e., rim) that divides the fluid filled volume of the reservoir into an aperture portion (i.e., the portion within the lens shaper that can pass light through) and a reservoir portion (i.e., the portion outside the lens shaper).</p> <div data-bbox="663 761 1791 1060" data-label="Image"> </div> <p><u>Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.</u></p> <p>Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.</p>

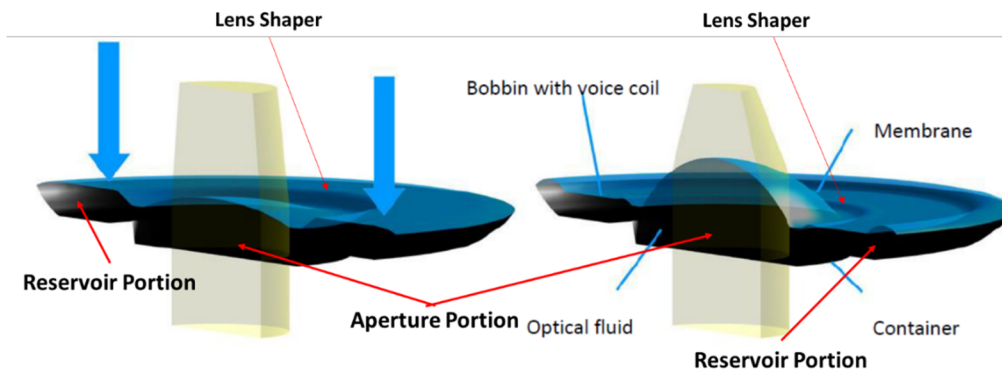


Figure 5: Working principle of the EL-10-30 series.

Optotune EL-10-30-Series Spec Sheet at 6.

[11D] wherein a portion of the rim is bonded to a portion of the first or second optical surface;

The Accused Product meet this limitation.

The lens shaper in the Optotune EL-10-30-C defines the clear aperture of the lens and does not move with the membrane as the lens is actuated. Therefore, the lens shaper is bonded to the membrane (i.e., first optical surface).

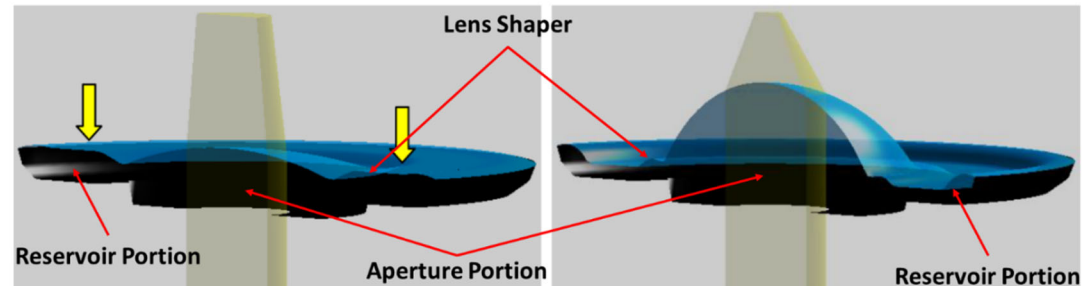


Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.

Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.

[11E] wherein one or more of the first optical surface or second optical surface is configured to deform as a result of a change in a pressure of the fluid;

The Accused Products meet this limitation.

The Optotune EL-10-30-C includes an electromagnetic actuator to apply a pressure to the fluid by pressing the outer portion of the membrane (i.e., first optical surface). The pressure change deforms the center portion of the membrane (i.e., first optical surface).

Working principle

The EL-10-30 is a shape-changing lens, as illustrated in Figure 5. It consists of a container, which is filled with an optical fluid and sealed off with an elastic polymer membrane. The deflection of the lens is proportional to the pressure in the fluid. The EL-10-30 has an electromagnetic actuator that is used to exert pressure on the container. Hence, the focal distance of the lens is controlled by the current flowing through the coil of the actuator.

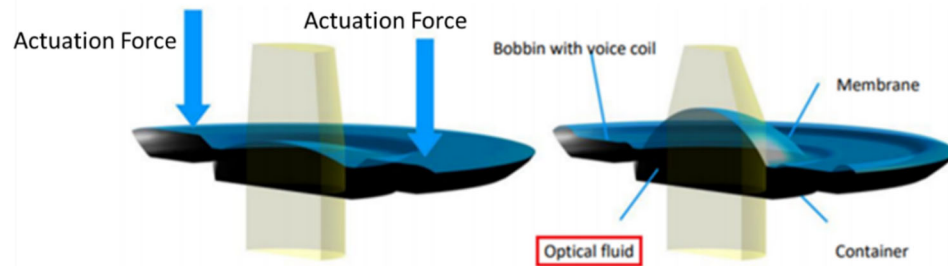


Figure 5: Working principle of the EL-10-30 series.

Optotune EL-10-30-Series Spec Sheet at 6.

Resolution and reproducibility

The step size of the focal power is limited by the resolution of the DAC of the current driver. For high precision applications a driver with 12 bits is recommended. As the relation between current and focal power is linear, the smallest step of e.g. the EL-10-30-C-VIS-LD about 0.0018 Dpt.

Unlike piezo systems, the EL-10-30 exhibits no hysteresis. The current through the coil induces a force, which is directly transferred onto the elastic membrane. There is no friction in the system. This means that at a constant temperature jumping between alternate current levels will always yield the same focal length. The effect of changes in temperature are described above. Optotune's Lens Driver 4 offers a focal power mode, which makes use of calibration data stored in the lens (EEPROM of the STTS2004). The absolute reproducibility achieved over an operating temperature range of 10 to 50°C amounts to typically 0.1 diopters. More details on the focal power mode are provided in the Lens Driver manual.

Optotune EL-10-30-Series Spec Sheet at 10.

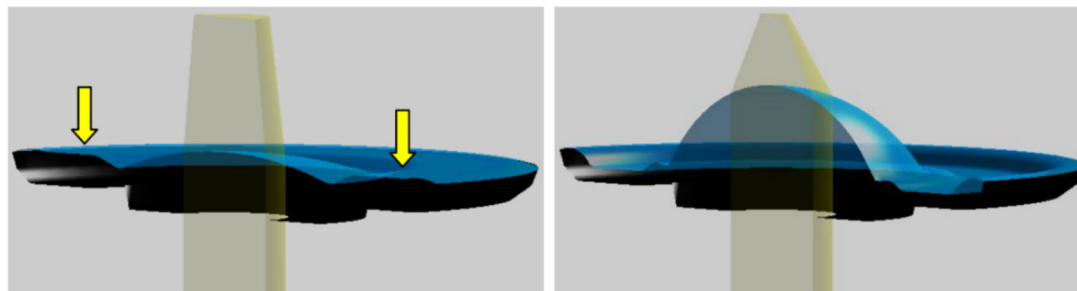


Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.

Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.

[11F] a piston member disposed for contacting an optical surface

The Accused Product meet this limitation.

The Optotune EL-10-30-C includes an actuation ring disposed for contacting the membrane (i.e., first optical surface) and pressing the membrane.

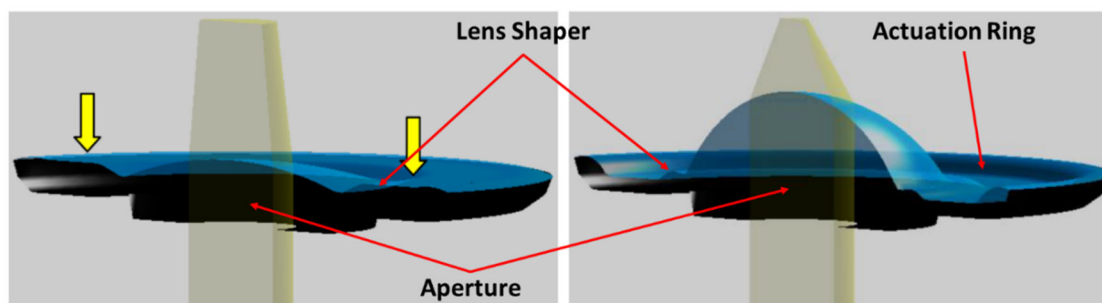
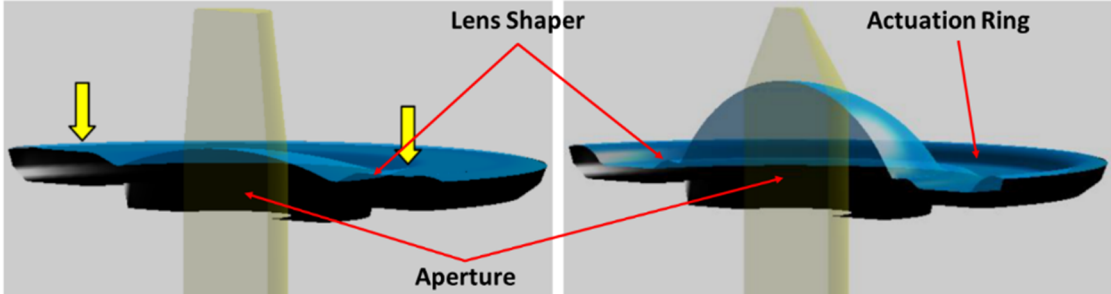


Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.

Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.

<p>[11G] wherein the reservoir is configured for translational motion relative to the piston, or the piston is configured for translational motion relative to the reservoir;</p>	<p>The Accused Product meet this limitation.</p> <p>The actuation ring (i.e., piston) in the Optotune EL-10-30-C is configured to be translated with respect to the reservoir. The actuation ring is driven by a voice coil to press against the membrane and the pressing force is substantially perpendicular to the horizontal plane, i.e., the relative motion between the actuation ring and the reservoir is translational.</p>  <p><u>Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.</u></p> <p>Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.</p>
<p>[11H] wherein said translational motion and said contact between the piston and an optical surface results in said change in pressure and said deformation of the first or second optical surface.</p>	<p>The Accused Products meet this limitation.</p> <p>The translational motion between the actuation ring (i.e., piston) and the outer portion of the membrane (i.e., first optical surface) results in the change in pressure and deformation of the central portion of the membrane (i.e., first optical surface).</p>

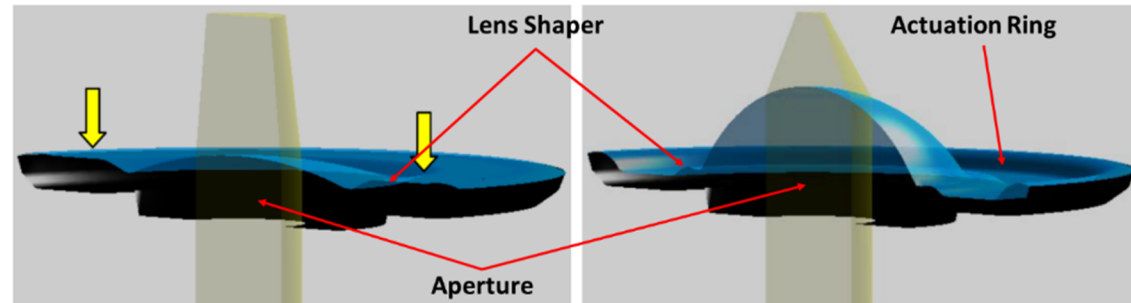


Figure 3: Working principle of the Optotune's EL-10-30. In this case, the lens-shaper ring remains in place relative to the container. The only movement is a ring that pushes down on the membrane with increasing current in the outer part of the lens, thus pumping the liquid into the lens that forms in the center.

Optotune Focus Tunable Lenses and Laser Speckle Reduction at 3.